# Economic and social approaches in external relations

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Abstract: If we were to look for a valid general term to define the period of the last two centuries in which global economic growth and cooperation between states have registered new development valences, it would certainly have attributed globalization. In business, the term is commonly used in economic contexts to describe an integrated economy marked by free trade, free flow of capital, and the use of foreign labor markets by corporations to maximize profits and benefits for the "common good of society." Globalization is mainly driven by the convergence of economic, political and cultural systems that need and in fact even promotes the increasing interaction of states and their relations of interdependence and integration of citizens regardless of origin. However, the main benefits of globalization can also have a flip side, causing risks that a less interdependent global economy would not face. Risk factors in international economic relations are diverse and may vary due to causes that are not strictly economic, such as geographical location, various historical conflicts, certain cultural conceptions or isolated events that may cause domino effects. The objective of the paper is to analyze the information and discover common points that can identify the risks in international relations, from an economic point of view. In order to achieve this goal, many methods and techniques of statistical analysis will be used. They were selected because of the ease with which they manage to solve real and common situations from the proposed problems.

*Keywords:* Globalization, Risk factors, International markets, Statistical methods, Quantitative analysis *JEL Classification:* F6, D81, D40, C1, C13.

## Introduction

Country risk refers to business risks, economic and political situations that are unique and specific to a particular state and that can cause unexpected investment losses. The main issues considered in terms of country risk relate to:

• Uncertainty associated with investing in a particular country and, more specifically, the degree to which this level of uncertainty can lead to losses for investors.

• Calculating international economic risks is a priority for many private or public institutions as it provides a broader perspective on domestic situations and investment opportunities.

• Political risk is a complex term, used in many ways. From an economic point of view, political risk can influence the aspects related to starting a business or attracting foreign investments. From the point of view of international relations, political risk can affect diplomatic ties between the states involved (Psychogyios et al. 2020). In practice, it is difficult to quantify political risk (Henisz et al., 2010).

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Therefore, the political risk ratings are estimated according to the subjective assessments of the experts in the field and contribute to the difficulty of data transparency and their veracity.

In this paper, we want to identify some economic links between the social aspects related to the population's trust in the regulatory systems (police, legislative system and political system) and the synthetic indicators of a country, comparing these links between EU countries and identifying at the base of these events.

# Literature review

Many business decisions are made based on estimates of the future. Making a decision based on estimates, assumptions, expectations, predictions, predictions about future events involves a good dose of risk, sometimes guite difficult to define and, in most cases, impossible to measure accurately, given the abstract nature of concept. In 1921, Frank K. Knight (1921) made the first theoretical analysis of economic decisions made in conditions of risk and uncertainty in his work Risk, Uncertainty and Profit. In Knight's view, risk was characteristic of that decision-making situation in which the decisionmaker could associate a mathematical probability with a sequence of events, the uncertainty being, implicitly, that in which the evolution of events could not be expressed in the form of a probabilistic law or equation. In his work, Knight delineated the risk of uncertainty, an approach challenged by a number of theorists who argued that, in Knight's approach, uncertainty and risk are, in fact, the same thing. Despite the fact that there are currently many papers on risk and uncertainty in economic decisions, the approach to these complex categories in economic theory is relatively recent. Formal attempts to analyze risk and its economic effects have been made since neoclassical economists (Daniel Bernoulli, William Stanley Jevons, Carl Menger, Francis Y. Edgeworth), by introducing the concept of marginal utility in approaching risky decision making (John et al., 2017). Generally, the concept is used to describe situations or events with uncertain results or consequences.

Uncertainty, as defined by Knight, is the expression of the random evolution of economic phenomena, especially since, for their analysis, the decision-maker has limited time and information (George L.S. Shackle, 1952). The economic decision is based on two variables: the perfection of the information (the information available to the decision maker is perfect and accessible to him at all times) and the perfection of the prediction (the risk-generating event will occur in the future exactly as predicted). In very few cases, however, the economic reality is characterized by perfection, the sources of information often distorting, by the quality (objectivity) and timeliness of the data, the real state of events or, conversely, unforeseen events overturn the initial predictions. Constantly oriented towards the most attractive earning opportunities, foreign direct investment has experienced an unprecedented development (Bekaert, 2015). This development, not at all surprising if we look only at the increasingly integrated international capital markets or the rapid means of disseminating and transmitting information, has led to a constant concern for the analysis of the main variables taken into account in the investment decision, among which risk occupies, undoubtedly, a fundamental place. Each of the three decision-making situations — certainty, risk, and uncertainty — is most often defined in relation to the other two. Such an approach makes it much easier to delimit as accurately as possible the scope of each concept and position it as accurately as possible in relation to the others. Depending on the degree of knowledge of the evolution and future effects of a particular event, the three concepts can be ranked as follows: at the extreme certainty and uncertainty, respectively, while the risk is placed on an intermediate position. In the light of the above, absolute certainty can be defined as the decisional situation in which the future evolution of events, as well as the consequences of a decision can be accurately predicted, with no errors or unexpected events. This decision-making situation is apparently a perfect situation for the operators in a financial market, who thus know all the information they need to make the best decision. In this context, the results of any action or decision would be known exactly before their production or adoption. At the opposite pole of the certain decision-making situation is the

absolute uncertainty. This is the situation in which the decision maker cannot anticipate the evolutions or his own future actions and / or decisions or those of others (Hermann Hope, 1997).

## Data

International economic relations concentrated in the Member States of the European Union are subject to several factors in terms of trading, exchanges and the maintenance of generally profitable international relations, taking into account several indicators captured in the table below, together with the amounts invested of the European Union in the local economy and the total amount of trade in the European Union, both expressed in the official currency of this area, Euro.

Country	Trust in	Trust in	Trust in	Percentage of	Government	Millions of	Millions
	the police	the legal	the	people	declared	euro	euro
	-	system	political	discriminated at	budget	invested	traded in
		-	system	work during	deficit	by UE	UE
			-	contract		-	

Source: Author's processing

The *Country* variable comprises 28 Member States of the European Union for which we have the following information saved in the database which we will further submit to an explanatory description. We mention that the data taken are from the calendar year 2019 and that the decision to choose this year is argued by the fact that it is the most recent year that was not influenced by the global pandemic that could have shown certain trends that are rather characteristic of a special period short-term, not general trends. All official data are collected from Eurostat's database and activity reports prepared by them during 2020.

*Trust in the police* is a variable that represents an average for two others: trust in the police system in terms of people living in that country and trust in this institution from the outside. This is an average of 1 to 10, with 10 being a total confidence and 1 a total lack of confidence. This is relevant because abuses and lack of transparency in certain sectors can make trading activities more difficult and risky, whether we are talking about goods, services or even non-physical goods.

*Trust in the legal system* is a variable that sums up the trust in the legal system, on a scale from 1 to 10, where 10 represents the maximum trust in the legal system, and 1 represents the total lack of trust in it. This is very important because it is a mirror of the applicability of the goods or assets insurance system, the confidence that there is fairness and transparency in the interest of all, not just the parties involved in that process, which leads to a high degree of confidence for potential consumers.

*Trust in the political system* is another variable that represents the country's confidence in the political class regarding their decisions and the confidence that they put the welfare of their country first and not their personal interests. Like the last two, it is presented on a scale of 1 to 10, where 1 shows that there is no trust in the political class, and 10 that there is total trust. This indicator is important because, for a period delimited by the constitution of each country, the decisions of politicians, rulers and other legal representatives of the respective people influence its course. This path also includes economic elements and these influence how other market players feel attracted or not to enter into agreements with those countries.

Percentage of people discriminated at work during contract is a percentage variable that shows us how many percent of a sample of 100 people felt in the past or even now, at some point that they are discriminated against by their employer, colleagues or other people. with which it must interact. Discrimination refers to hatred of race, ethnicity, sex, nationality or even age and indicates the degree of education of that nation in an indirect way. If a country has such a high value indicator, we can

express the opinion that economic representatives from other states who would like to interact with economic agents from that country will have at least a second thought before continuing the business.

Government declared budget deficit shows the value declared by the government of the respective country for the budget deficit. The simple defined budget deficit is when government spending exceeds revenue. An important aspect of this indicator is that, being declared by the government of the country, it can be totally representative or not, making it more or less qualitative. If it fully reflects the expenditures with various investments made by the government, it is a qualitative one, and if it has gaps regarding different transactions, projects, or focuses on various aspects that do not represent reality, it is a non-qualitative one.

*Millions of euros invested by the EU* show the value, in millions of euros, of the investments made by the European Union in that country. Although it is a gross value and does not fully refer to the overall results as more developed countries do not benefit from foreign investment to the same degree as the least developed, a high number certainly indicates a level of confidence allocated by EU members in the country. in relation to the value of the euro.

*Millions of euros traded in the EU* represent the value in millions of euros given to all transactions given in 2019 made with other members of the European Union. This shows the degree of activity, the value of transactions being in favor of the number because in the economy the final monetary result after an activity is the one that takes precedence over the effort made.

# Methodology

In statistics, dependency is a statistical relationship between two random variables or two sets of data. The correlation refers to a wide range of statistical relationships involving dependence. For the study of the dependence between two variables, each of them being subjected to a random scattering, methods of correlation analysis are applied. The correlation analysis studies the average law of behavior of each of the variables according to the values of the other variable, as well as the measure of the dependence between the considered variables. This method of statistical calculation can be represented in three ways, namely Pearson, Spearman, Kendall.

*Pearson* defined the correlation coefficient as an indicator whose purpose is to help measure the intensity of linear links between two or more variables that will be of the numerical type. The correlation coefficient will always be constant, however we will report on the reporting direction of the two variables and do not take into account the existing dependencies between them.

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$
(1)

Spearman, on the other hand, is another type of coefficient, of static type and can be identified following a non-parametric test.

$$r = 1 - \frac{6\sum d^2}{n^3 - n}$$
(2)

*Kendall* is another correlation coefficient used to measure power intensity between ranks. (Andrei & Stancu, 1995)

$$r = \frac{(number of matching pairs) - (number of inappropriate pairs)}{n(n-1)/2}$$
(3)

The interpretation of the coefficients following the application of the three types of correlations is made by analyzing the interval -1 and 1 which includes all possible values.

The Chi-squared statistical test is a test that shows the degree of dependence or independence for variables. The test will be applied to categorical variables that are part of a single data set and is used to determine the level of connection between them.

The premise from which this test starts is:

H<sub>0</sub>: Variable A and Variable B are independent / not dependent.

H<sub>1</sub>: Variable A and Variable B are not independent / are dependent.

The degree of freedom is calculated using the formula:

$$DF = (r - 1) * (c - 1)$$

where r represents the number of categories of variable 1, and c represents the number of categories of variable 2.

Continuing, the frequency is used to calculate:

$$E_{r,c} = \frac{(n_r * n_c)}{n} \tag{5}$$

where n is the number of observations of each variable, respectively for the entire data set analyzed.

Statistically, the Cramer V test is the method of measuring the assertion for two qualitative variables, where they are given values between 0 and 1. Its base is in a Pearson chi-squared test and has as its method to calculate the following mathematical formula:

$$V = \sqrt{\frac{\varphi^2}{\min(k-1,r-1)}} = \sqrt{\frac{\frac{\chi^2}{n}}{\min(k-1,r-1)}}$$
(6)

# **Results and discussions**

Next we will analyze the links between the variables. Since all the variables in our database are numerical, we can find the mathematical correlation between them, using the three measurement indicators provided by Pearson, Kendall & Spearman.

### Figure 1. Correlogram of attributes using the Pearson indicator



Source: Author processing based on data collected from several sources

It can be seen in the correlogram whose construction was based on the following Pearson coefficient:

(4)

• Traded EU, total value of transactions with other countries in the European Union in 2019 we note that the correlation between them and Government Budget Deficit, People Discriminated Percent, Trust Political Sys and Trust Legal Sys correlation is extremely small, with very close values to zero. This shows us that they are not correlated at all. Looking at Traded I and EU Investments we notice that there is a correlation of 0.89, meaning an extremely high value.

• Regarding Investments EU, we notice that it has values similar to those of Traded EU, a reconfirmation of the correlation between them.

• We notice that the government budget deficit is a correlation of 39% with Trust Political Sys and 44% with Trust Legal Sys. This does not show that, although not intuitively, a one-unit increase in the budget deficit will explain 39% of the increase in confidence in the Political System and 44% in the increase in confidence in the legislative system, respectively. We can deduce that this phenomenon is related to the fact that this declared figure, and a high budget deficit figure, although bad economic news, shows a sincerity and a desire for recovery and probability, put in a specific context, can come with solutions for possible future recoveries.

• Regarding People Discriminated Percent we notice that it is very low in relation to all the other variables in our data set. Therefore, there is no mathematical correlation between the percentage of people discriminated against in the workplace and trust in the police, government, legislation, but also regarding the values of transactions or investments coming from the European Union.

• Focusing on trust between the legislative system and trust in the government, we notice that we have a value of 0.89, i.e. a change with a unit in value. Trust in the legislative system will explain 89% - a change in the value of trust in government institutions. This does not mean that the answers to the questionnaire on the basis of which this survey was created associate laws, applicability and possibly the effect they have on them with the government, which, depending on the country, can be wrong because in many democratic countries where there is a parliament, laws are enacted and voted on by parliament and the government has no role in this.



Figure 2. Correlogram of attributes using the Kendall indicator

Source: Author's processing based on data collected from several sources

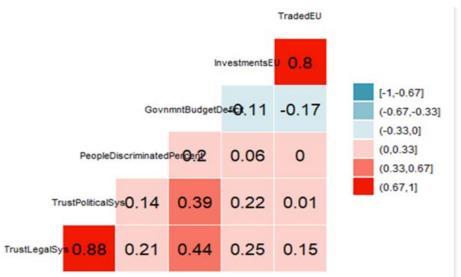
Constructing the same type of correlogram as for the past indicator, but using Kendall's correlation indicator (Figure 2), we notice that the pairs of indicators are not different, but only the fence of its intensity:

- the highest value of the correlation is between confidence in the legislative system and trust in the political system, respectively 0.72.

- the lowest value is between the declared government deficit and the sum of millions of euros traded in the European Union, respectively -0.13. This translates into a conclusion that there is no statistically strong correlation between the two using the Kendall indicator, with the value being in the range of 0 and -0.33, respectively, i.e. a very low inverse correlation.

Observing the correlation chart attached above, which is built on the Spearman rank correlation indicator (Figure 3), we again notice a high approximation of values between, this time, all 3 indicators, the major differences being only two values that are now more pronounced, 0.39 and 0.44, which are the correlations between the budget deficit and respectively the trust in the political system and the trust in the legislative system:

- the highest value in this correlation is 0.88, a value between 0.67 and 1, which translates into an extremely high correlation between the value of trust in the political system and trust in the legislative system.
- the lowest is -0.17, the correlation between the government budget deficit (the declared one) and the amount of transactions made within the European Union. This value is extremely low and shows that there is an inverse correlation between the two indicators for the countries analyzed, but it is very weak.



## Figure 3. Correlogram of attributes using the Spearman indicator

Source: Author's processing based on data collected from several sources

Choosing the right correlation is a final step in analyzing the correlations between the values in our previously analyzed dataset. To do this, we must first re-analyze our data set. We know that our values have a different distribution than that of a bell, not one that can be characterized as normal. Thus we can exclude the Pearson correlation coefficient because it can only be used in a distribution or a series of values as close as possible to a normal distribution.

Remaining with Kendall and Spearman, respectively, we need to re-analyze the usefulness of each: if we know about Spearman that it is mainly used for ordinal stairs, we know that Kendall is much more

used to be designed to analyze data sets by a relatively low volume, small and it has mainly the coefficient of error, although existing, much smaller.

In conclusion, we will continue to use and interpret mainly the values obtained from the use of the Kendall coefficient. To ensure that the correlation we found is statistically valid, we will apply the following code sequence in the R language to see if the p-value will have a value above 0.05.

Equation:  $corr3 \leftarrow cor.test(Date\_curr$TrustLegalSys, Date\_corr$GovnmntBugetDeficit, method = "kendall")$  (7)

Following the execution of the previous code sequence, we obtained the following values for the corr3 layout:

```
> print(corr3,short = FALSE)
            Kendall's rank correlation tau
data: Date_corr$TrustLegalSys and Date_corr$GovnmntBudgetDeficit
z = 2.4816, p-value = 0.01308
alternative hypothesis: true tau is not equal to 0
sample estimates:
            tau
0.3300041
```

We notice that the p-value index has a value equal to 0.01308, a value that is strictly and clearly below 0.05, which gives us the certainty that our analysis is valid, that it has a statistical relevance and that it has easily rejected the null hypothesis.

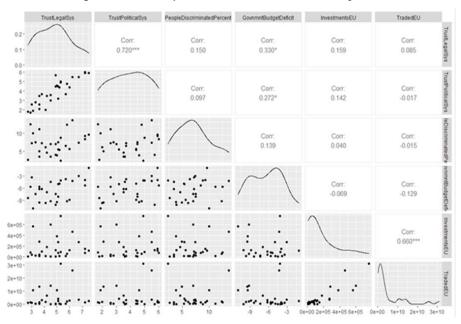


Figure 4. Heatmap of value distribution, density and correlation of values

Source: Author's processing based on data collected from several sources

Attached above we see a heatmap graph obtained using the ggplot package and the ggpairs function (package = "ggplot" in R). From this we can observe in more detail some of the aspects already analyzed previously:

• The correlations obtained by applying the two methods show the same estimates. The Kendall correlation index, with 3 degrees of confidence, shows the connection between the trust in the police institution and that of the legislative institution. Thus, when changing the confidence for the first variable by one unit, the confidence in the second variable changes by 72%.

• Graphs of the distribution of values for investments made by the European Union and the amount of trading of states in the EU are similar, with a large number of values close to the beginning falling sharply immediately before quartile 1. This can be interpreted as the simple fact that most EU countries are directly correlated with the number of monetary transactions in the European Union. From this we can also deduce that investments made in a given Member State can also have a domino effect on the external economy: a country that has benefited from large investments will then be able to produce a large number of valuable monetary transactions.

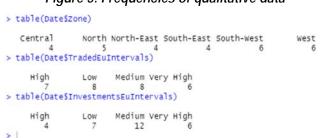
• Observing the actual distribution of values, we see that most create a cloud of values very close to the start of distribution. Analyzing our data set manually, we noticed that the values that tend to be outliers and far from the cloud of values are generally the same countries: Germany, France and Belgium.

To see if we can find more interpretable information on economic risk in European Union trading, we've added three new non-numeric categorical or factorial attributes to our dataset:

• The Zone attribute represents the area of the European space in which that country is located. These have been taken from the official website of each country in the description section to avoid any problems or inconsistencies. We chose this attribute to see if the geographical position of a country offers an advantage from an economic point of view. The premise from which I started was that there may be certain advantages: some countries on high priority roads on international routes, trips to the seas or oceans to have an advantage in intercontinental trade, etc.

• The TradedEuIntervals attribute is formatted based on the TradedEu attribute, dividing the countries into the following categorical values: Low, Medium, High and Very High.

• The InvestmentsEuIntervals attribute is created based on the InvestmentsEu numeric attribute which, like TradedEuIntervals, is divided into the following values: Low, Medium, High and Very High.



# Figure 5. Frequencies of qualitative data

Source: Author's processing based on data collected from several sources

We continue with the presentation of the contingency matrices for the variable Area in relation to the two categorical variables, Traded Eu Intervals and Investments Eu Intervals.

-	table(Date	Szone	Dat	eSTrade	dEuInt	terval	5)
		High	LOW	Medium	Very	High	
	Central	3	0	1		0	
	North	2	1	2		0	
	North-East	1	3	0		0	
	South-East	0	1	3		0	
	South-West	0	2	2		2	
	West	1	1	0		4	
•	table(Date	\$zone	,Dat	e\$Invest	tment	SEUINT	ervals)
		Нigh	Low	Medium	very	High	
	Central	0	0	4		0	
	North	2	1	2		0	
	North-East	1	32	0		0	
	South-East	0	2	2		0	
	South-West	0	1	3		2	
	West	1	0	1		4	
•	table(Date	\$⊤rad	edEu	Interva	ls,Dat	te\$Inv	estmentsEuInterval
	1	High I	LOW I	Medium	very i	High	
	High	3	0	4		0	
	LOW	0	5	3		0	
	Medium	1	2	5		0	
	Very High	0	0	0		6	

#### Figure 6. Contingency matrices

Source: Author's processing based on data collected from several sources

Analyzing the previously created contingency matrices, we can draw the following conclusions:

- regarding the links between the Country Area and the range in which the value for trading in the European Union is, we note that the only areas that have values in the Very High range are West and South-West. This shows us that the countries in these areas are particularly well established in the ranking of commercial transactions and that they are prosperous areas. We also notice that, starting from the West to the East, respectively from the North to the South, the volume of transactions tends to decrease. This does not show that in general, the further east we go, in the ex-communist space, the transactions tend to be less than in the western areas.

- regarding the links between the value range for investments made by the European Union and Zones, we observe an extremely similar resemblance to the links between the variables Zones and TradedEuIntervals. This reminds us that we had an 80% correlation between the two values, TradedEu and InvestmentsEu, which shows us that, first of all, the creation of Intervals data points was done correctly, the correlation is still high and it is correct, now checking it with the geographical area of the respective country from the analysis made.

- the last contingency matrix represents the links between TradedEuIntervals and InvestmentsEuIntervals. Checking the values for Low in both variables, we notice that they are identical and that there are no values for High or Very High, thus showing that there are no significant inconsistencies between the two. We also notice that the very high values of both variables are absolutely symmetric. This can be interpreted as a conclusion that the countries that receive investment from the European Union are countries that manage to assert themselves in the European trade area.

We will continue with the application of the Chi Square test for all the pairs formed and presented above, to see if it will succeed or not to accept a null hypothesis.

#### Figure 7. Chi-square tests

> chisq.test(Date\$InvestmentsEuIntervals,Date\$TradedEuIntervals)

Pearson's Chi-squared test

data: Date\$InvestmentsEUIntervals and Date\$TradedEUIntervals
X-squared = 41.04, df = 9, p-value = 4.918e-06

Source: Author's processing based on data collected from several sources

It can be seen that for all three tests applied, we have values for p-value strictly less than 0.05: 0.01, 0.01 and one extremely low.

This gives us the assurance that we can continue to analyze the three pairs of attributes and calculate the contingency coefficients of the pairs.

#### Figure 8. Chi-square test results

```
> ContCoef(DateSzone,DateSTradedEuIntervals)
[1] 0.7050221
> ContCoef(DateSzone,DateSInvestmentsEuIntervals)
[1] 0.706861
> ContCoef(DateSInvestmentsEuIntervals,DateSTradedEuIntervals)
[1] 0.765475
```

Source: Author's processing based on data collected from several sources

We notice that in the case of all the three sets of pairs of values analyzed, the result of the contingency test is between 0.705 and 0.765, which results in a very strong dependence between all three pairs of values and implicitly between all three.

#### Figure 9. Cramer's V test results

```
> cramerv(Date$Zone,Date$TradedEuIntervals, bias.correct = FALSE)
Cramer V
    0.574
> cramerV(Date$Zone,Date$InvestmentsEuIntervals, bias.correct = FALSE)
Cramer V
    0.5769
> cramerV(Date$TradedEuIntervals,Date$InvestmentsEuIntervals, bias.correct
    = FALSE)
Cramer V
    0.6868
```

Source: Author's processing based on data collected from several sources

We have attached the results of applying the Cramer V test above to all three pairs of values in our dataset. To determine if the links between our values exist or not, the value of the crammer indicator must be above 0.10. Note that for all three value pairs we have values between 0.574 and 0.686. Therefore, we can conclude with certainty that our links exist, all values being much higher than the minimum threshold of 0.10.

#### Figure 10. Likelihood test results

Source: Author's processing based on data collected from several sources

It can be seen that we have a p-value of less than 0.05 for all the pairs of variables analyzed. This confirms to us that the tests are valid and that we have rejected the null hypotheses. Regarding the values, we notice that we obtained 32.37, 32.69, 41.28. Thus, we are confirmed that we have strong, positive and direct links between the 3 attributes and their pairs.

## Conclusion

Based on the statistical data obtained and the analysis performed, it can be seen that there is a strong correlation between the amounts invested by the European Union in a country and the volume of transactions of this country within the European Union. This shows that in the case of a country that receives confidence from the EU, the risk becomes assumed and the default number of transactions will increase.

For a thorough analysis of the risk factors in international economic relations, the auxiliary factors of the economic process itself must also be taken into account, such as citizens' trust in the police, confidence in the country's legal and legislative system and trust in the political system. However, data such as the declared budget deficit, the amounts traded in the European Union and the amounts invested in the EU should not be neglected in any way.

There is also a link between EU investment and confidence in the country's political system and government. The higher the confidence, the higher the amount invested in the country, these factors representing a risk in an economic transaction.

There is also an inverse link between the government's declared public deficit and the amounts traded or invested in the EU, which leads to the substitution of economic information that could affect bilateral relations between countries in the economic context of markets.

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